



NATIONAL PARK SERVICE

Environmental Audit Program

EnviroCheck Sheet

Paints and Solvents
June 2002 Update

PAINTS AND SOLVENTS

Paints and solvents are used throughout the National Park Service (NPS). Paints are used for coating buildings, walls, trim and metal, both indoors and out. Solvents are used either as a paint thinner in painting operations, or as a cleaner for removing dirt and grit from metal parts or painting surfaces.

*NOTE: This check sheet is not intended to include comprehensive information regarding the management of paints and solvent, particularly if it is a hazardous waste (hazardous waste is regulated under the Resource Conservation and Recovery Act (RCRA)). Instead, it is intended to focus attention on an often-generated park waste stream that is easily overlooked as a **potentially** hazardous waste that must be managed as such. For comprehensive information regarding hazardous waste management, see the "Hazardous Waste Management EnviroCheck Sheet."*

Auditor's Guidelines:

Records to Review

- Spill records
- Inventory records
- Material Safety Data Sheets (MSDSs)
- Training records
- Hazard Communication Program
- Hazardous waste manifests
- Purchase orders

Features to Observe

- Paint and solvent storage areas
- Shop activities
- Solvent parts washers

Persons to Contact

- Maintenance supervisor
- Buildings and Utilities staff
- Auto mechanics
- Painters

BACKGROUND

Paints

There are two main types of paint products used by the parks: 1) oil- or solvent-based paint and 2) latex- or water-based paint. Latex paints are preferred because they contain lower levels of solvent. The use of solvent-based paint should be limited to essential applications where latex-based paint is unsuitable, such as in metal coatings or heavy-duty primers. Latex substitutes are almost always available for most NPS needs and should be selected over solvent-based products.

Latex paints typically contain some solvent but at a relatively low level (e.g., <10%). There are even some latex-based paints that are solvent free (consult the MSDS or paint container label.). Latex-based paints should be managed similarly to solvent-based paints. Specifically, latex-based paints should have adequate ventilation in storage and use. Also, because waste latex-based paint *could* become a RCRA hazardous waste based on toxic metal content or ignitability, it needs to be characterized. However, most waste latex-based paint will not be a RCRA hazardous waste.

An additional paint related concern occurs when lead-based paint is abated. Lead-based paint (LBP) may be found on the surfaces of older (e.g., historic) buildings. Any building built before 1978 could contain lead paint. When

This document does not necessarily contain all information needed to determine compliance status.

such building surfaces are stripped, the waste LBP may be a RCRA hazardous waste due to lead content. (NOTE: Stripping LBP may trigger respiratory protection requirements; see the Respiratory Protection Check Sheet for more information).

Solvents

Solvent is a broad term used to describe a liquid that dissolves other materials. For the purposes of this EnviroCheck Sheet, the term “solvent” by itself means organic liquids used for cleaning and/or preservation. For example, vehicle maintenance cleaning and degreasing operations involve applying a solvent (e.g., mineral spirits) to a part. Solvents are also used in laboratories (e.g., alcohol), building maintenance (e.g., wax stripper), and in some painting operations (e.g., paint thinner). Solvents may be relatively pure (e.g., formaldehyde) or combined in mixtures to formulate a usable product (e.g., window cleaner). Liquid fuels, such as gasoline, or kerosene, could also be considered solvents if they are used as such.

Halogenated solvents have been used in part for their stability, fast drying characteristics, and effectiveness in removing oils. Many of the characteristics that make these chemicals good cleaning compounds also make them hazardous to the environment. Halogenated solvents such as chloroform, perchloroethylene, trichloroethylene, trichloroethane, and methylene chloride have been associated with such environmental damage as stratospheric ozone depletion, global warming, and ground smog formation.

Solvent-based paints and solvents create both environmental, and safety and health, concerns for the NPS. Specifically, health concerns relate to worker exposure to solvent vapors. Safe storage and use requires adequate ventilation, for fire prevention during storage, and worker protection during application. **The NPS is committed to discontinuing the use of all solvent-based paints and solvents.**

COMPLIANCE REQUIREMENTS

Hazardous Waste Management Requirements

Following is a summary of waste management requirements applicable to paint waste if it is hazardous. See the “Hazardous Waste Management Check Sheet” for more complete information on waste characterization, handling, labeling, container management, and storage.

Waste Characterization

Waste is any product that can no longer be used for its intended purpose. This includes old product (e.g., aged product inventory or stripped paint), damaged product (e.g., frozen product), and off-specification paint (e.g., bad mix). Parks are responsible for properly characterizing all of the waste they generate. This characterization process enables parks to determine whether the waste is hazardous and needs to be managed under RCRA regulations. Refer to the “Hazardous Waste Management EnviroCheck Sheet,” for information regarding proper waste characterization procedures.

The following table provides some typical hazardous waste codes that parks may need to assign to paint and solvent waste. It is important to note that a waste can have more than one waste code. (Note: Waste paint chips from abatement are not addressed by this EnviroCheck Sheet.)

Hazardous Waste Code	Waste Characteristic	Uses Applicable to NPS Facilities
D001	Ignitable	The most common hazardous waste code assigned to paint and solvent waste generated by parks. They must be managed as an ignitable hazardous waste if the flashpoint of the waste is below 140° F. The best source of information to make this determination is the MSDS for the product or analytical testing performed on a representative sample.
D002	Corrosive	Some solvents such as methylene chloride may be corrosive. A solvent waste must be treated as a corrosive waste if it has a pH of less than 2 or greater than 12.5. The best source of information to make this determination is the MSDS for the product or analytical testing performed on a typical sample of the waste.
D004 - D0043	Toxic	Paint and solvent waste will receive one of these waste codes if it leaches any of the toxic metals listed in 40 CFR 261 Subpart C. Typically, parks should test their waste for the toxic metals listed under this section. For example, if a waste stream contained greater than 1.0 mg/L of cadmium using the TCLP testing procedure, the waste would be considered hazardous and assigned a waste code of D006.
F, K, U, & P Listed	Other Listed Wastes	Listed wastes, as defined by 40 CFR 261 Subparts C and D, include non-specific source, specific source, off-specification, and residue or spilled materials. Refer to these lists when characterizing any waste stream. As an example, if a solvent (e.g., acetone and xylene) were used to clean paint residue from tools and equipment, the spent solvent paint waste would be an F003 waste.

Handling

Many paints and solvents meet the OSHA definition of flammable material, and as waste will meet the RCRA definition of hazardous waste. OSHA regulates the storage and handling of flammable materials under 29 CFR 1910.106. RCRA regulates the management of paint and solvent waste under 40 CFR 261. Additionally, OSHA regulates the general management of all paints and solvents under the hazard communication standard in 29 CFR 1910.1200. See the Reference section of this EnviroCheck Sheet for more information.

Labeling

Labeling requirements applicable to paint and solvent are in 29 CFR 1910.1200 and 40 CFR 261 for RCRA hazardous waste. All paint and solvent containers should be labeled with the name and the applicable National Fire Protection Association (NFPA) hazardous label. All containers of applicable waste (typically solvent-based paints) should be labeled with the date accumulation began and the words "Hazardous Waste" in large readable letters. The name of the waste, and the applicable NFPA hazard label, should also be present on the waste containers.

Container Management

Containers used to store paint and solvent, and their wastes, must be in good condition and free of leaks. Containers should be compatible with the material they are holding. Containers used to ship hazardous paint waste must meet the Department of Transportation (DOT) regulations applicable to the waste stream. Containers storing waste must be sealed during storage and only opened to add waste material to the container.

Storage

Containers of flammable paint and solvent, and their waste, must be stored next to compatible materials. Flammable materials that are not being used must be stored in flammable storage cabinets that meet OSHA and NFPA requirements. For example, never store solvent-based paints next to strong acids. All hazardous waste

accumulation areas managed by the parks should have secondary containment. Refer to the EnviroCheck Sheet titled, “Hazardous Waste Management” for a more detailed description of hazardous waste storage requirements.

Emission Standards for Solvent Cleaning Machines

Solvent cleaning machines that use halogenated solvents are regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAPs) 40 CFR 63, Subpart T of the Clean Air Act (CAA). A solvent “cleaning machine” may include a tank or tub, which holds more than two gallons of solvent, into which parts may be dipped for cleaning. The solvent must contain methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, or chloroform, or any combination of these halogenated solvents, in total concentration greater than five percent by weight, as a cleaning and/or drying agent. If a park uses one of the solvents listed above, it should then be determined if it is used in a solvent cleaning machine, as defined under 40 CFR 63.

In the event a park does use a halogenated solvent in a regulated “cleaning machine,” the park should be encouraged by the auditor to discontinue its use and find a suitable alternative (the Managing Solvent Waste EnviroFact Sheet provides internet links to solvent substitute databases). The alternative is to ensure compliance with the NESHAP. Requirements include notifying the appropriate regulatory agency (check with state and regional Environmental Protection Agency (EPA)) that the parts washer is being used. Other requirements include keeping the cleaning machine closed except when in use, and operating it to minimize emissions from evaporation. Keep in mind, if another type of solvent or an aqueous cleaner is used at the park, but not in a cleaning machine, as defined in 40 CFR 63, these regulations **do not** apply.

MISCELLANEOUS ISSUES

Recordkeeping

Tracking paint and solvent disposal is required under RCRA hazardous waste regulations. It is also important that parks measure the effectiveness of their paint and solvent reduction or elimination strategies so that they can demonstrate an active and successful pollution prevention program. Each park should track the following parameters on a continuous basis:

- Quantity purchased and used;
- Reduction in applications;
- Quantity and quality recycled;
- Quantity shipped off-site as hazardous waste;
- Quantity released to the air;
- Quantity disposed of; and
- The adequacy of substitutes to meet park needs.

Lead-Based Paint Management

Many existing structures at parks have been previously coated with lead-based paint (LBP). Although LBP products are not commercially available today, many parks must manage buildings and equipment that had this material applied in the past. 40 CFR 261 - 272 establishes identification, handling, and disposal requirements for hazardous waste including lead containing waste. Parks must properly manage all activities that remove LBP and its waste. Additional information is provided by 40 CFR 745 on lead-based paint abatement requirements in park housing units.

POLLUTION PREVENTION

Many opportunities are available to reduce, reuse, recycle, substitute, or eliminate paint and solvent usage. A park's goal in paint management should be to discontinue the use of all solvent-based paints. Good housekeeping practices (e.g., avoiding overspray, donating excess inventory) and waste segregation (e.g., keeping thinner out of waste latex paint) can also greatly reduce the amount of paint waste generated.

A park goal in solvent management should be to remove all solvents from their shops or other facilities that could end up as hazardous waste since cleaning solvents and degreasers are probably the largest hazardous waste streams found in maintenance shops at parks. Parks must evaluate whether it is possible to not clean a part, clean it without using solvents, use an alternative cleaner or process, or use a less hazardous chemical to clean parts that must be cleaned using solvents. Good housekeeping practices and waste segregation can also greatly reduce the amount of solvent waste generated.

The best way to meet pollution prevention goals is by applying one of the many *source reduction* techniques. Reuse and recycling are other pollution prevention methodologies, however, recycling should only be considered after source reduction has been discounted as a means to reduce or eliminate wastes.

Source Reduction

Source reduction techniques reduce the quantity and/or toxicity of generated waste. Source reduction strategies include source control and product and process changes and efficiencies. "Source control" can include material substitution, or improved operating practices. Source control methods reduce emissions or limit the amount of waste generated by a painting or solvent-using process. "Product changes" include the substitution of toxic paints or solvents with alternative products that present a reduced level of risk to human health and the environment. Product change may also include switching from materials that require frequent painting (e.g., wood) to products that do not require painting (plastic). "Process changes" mean changing from a process that uses paints or solvents to a process that will reduce or eliminate the need for painting or using solvents.

Following are examples of source reduction strategies that could be implemented at an NPS facility:

Source Reduction Strategy	Benefits	Limitations
1. Substitute solvent-based paints with latex paints.	<ul style="list-style-type: none"> Reduced air emissions. Improved indoor air quality for workers. Reduced or eliminated hazardous waste stream. 	<ul style="list-style-type: none"> May not last as long. May not be compatible with all surfaces.
2. Paint less frequently with solvent-based paints.	<ul style="list-style-type: none"> Reduced air emissions. Reduced hazardous waste generation. Cost savings. 	<ul style="list-style-type: none"> Facilities may not look as good. Equipment may not get proper protection needed from coatings.
3. Use thinner coats when painting with solvent-based paints.	<ul style="list-style-type: none"> Reduced air emissions. Reduced hazardous waste generation. Cost savings. 	<ul style="list-style-type: none"> Practice may increase frequency of painting. Equipment or structure may not be properly protected.
4. Substitute solvent cleaner with non-toxic turpentine or citrus-based cleaners.	<ul style="list-style-type: none"> Eliminates more toxic solvent use. Less likely to generate hazardous waste. 	<ul style="list-style-type: none"> May not be as effective for all applications. Generates wastewater that must be characterized and disposed.
5. Use add-on controls such as ventilation control, covers and enclosures.	<ul style="list-style-type: none"> Reduced air emissions. Improved indoor air quality for workers. Reduced usage rates of solvents. 	<ul style="list-style-type: none"> Significant costs. Air emissions still occur. Hazardous waste is still generated.
6. Substitute solvent cleaning with aqueous power washing.	<ul style="list-style-type: none"> Reduced air emissions. Reduced cleaning times. Greatly reduced health hazards. 	<ul style="list-style-type: none"> Wastewater generated may need to be treated and discharged. Some parts cannot withstand high temperature and pressure of sprays. System may not remove certain caked-on dirt.
7. Substitute solvent cleaners with automatic aqueous (i.e., non-solvent) cleaners.	<ul style="list-style-type: none"> Eliminate the need for hazardous solvents. Cleaning effectiveness can be comparable to solvent cleaners due to increase contact times and the development of effective new cleaner technologies. The amount of wash water generated can be very low or eliminated through the use of closed loop systems. Systems are easy to install and require low worker training. Technology uses less cleaning agent than traditional methods. Health hazards are greatly reduced. 	<ul style="list-style-type: none"> Wastewater and solids generated by systems have to be properly treated and discharged. Certain solvent cleaning applications cannot be substituted. The technology has a higher energy requirement compared to solvent cleaning due to need for greater drying assistance. Systems have high initial capital cost.

8. Substitute solvent cleaners with ultrasonic cleaners.	<ul style="list-style-type: none"> • Reduced air emissions. • Reduced hazardous waste generation • Systems can remove dirt from small holes that conventional solvent cleaners could not. • Systems remove inorganic particles as well as oils. • Processing time can be reduced • Health hazards are greatly reduced • Reduced solvent costs. 	<ul style="list-style-type: none"> • High initial capital costs. • Wastewater is generated that has to be treated and discharged. • Whole part must be immersed. • Dryers may need to be used. • Energy use is greater. • Thick oils and grit can limit cleaning ability. • Operating parameters must be monitored closely.
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Other strategies to reduce solvent-based paint usage are to:

- Maintain an inventory of paint that is needed in each season. Avoiding excess storage usually means less paint will go to waste because it is old.
- Combine remaining paints where color is not essential. Instead of discarding odd lots of similar paints (i.e., solvent- or latex-based), it may be possible to mix them to create a unique product, which could still be used in nonessential applications. This is better than discarding useful products.
- Use materials with surfaces that do not need to be painted. For example, specify long life non-corroding materials (e.g., recycled plastic) for decking or benches, or aluminum or fiberglass hulls (instead of wood which must be painted periodically) for boats.
- Use alternative technology for spray-painting to reduce air emissions.

Recycling

If source reduction technologies are not available, recycling should be used where possible to minimize or avoid the need to treat wastes that remain after viable source reduction options have been evaluated and/or implemented.

Paint recycling can be accomplished by contracting out to an off-site recycler. Recycling both solvent and latex-based paints is possible. There is a limited supply of facilities currently providing this service. However, waste solvent-based paint can often be shipped to any solvent recovery vendor. Contact other parks in the area to exchange paint.

On-site solvent recycling can be performed with a commercially available recovery unit. On-site recycling is most effective when the solvent is used in small quantities and for frequently used materials. On-site recycling is inexpensive, eliminates the need to accumulate significant quantities of spent solvents, and eliminates transportation, costs and risks. However, before performing on-site recycling, parks must review state environmental regulations for the specific intended use to assure compliance with regulations that control the treatment of hazardous wastes. Depending upon the type of solvent the park wishes to recycle and the configuration of the recovery unit, solvent recycling may not be permitted under the hazardous waste regulations applicable to the park. In addition, whereas solvent recovery equipment may be acquired easily, consideration must be given to training park personnel in its operation and maintenance.

SUCCESS STORIES

- Acadia National Park and Shenandoah National Park use water-based parts washers that eliminate the need for solvents.
- Wright Brothers National Monument purchased 12 picnic tables of recycled plastic/recycled lumber. The tables cost \$400 to \$442 each and require no maintenance. Regular tables require painting or staining every one to three years.

FOR MORE INFORMATION

- NPS EnviroCheck Sheets: Hazardous Waste Management; Hazard Communication; Respiratory Protection Program; and Hazardous Material Storage.
- NPS Hazardous Waste Management Team at 202-565-1240 x3.
- EPA RCRA Hotline at 1-800-424-9346.
- EPA Solvent Alternatives Guide (SAGE) at <<http://clean.rti.org>> or call 919-541-0800.
- EPA Coatings Alternatives Guide (CAGE) at <<http://clean.rti.org>> or call 919-541-0800.
- EPA Paint and Coatings Compliance Assistance Center <<http://www.paintcenter.org>>



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CHECKLIST ITEM	PRIORITY	NOTES
<i>Hazardous Paint Waste</i>		
1. Oil or solvent-based paints are not disposed of by allowing the waste to air dry/evaporate. [40 CFR 268.4(b)]	2	
2. If hazardous solvents are used at the facility, park staff does not allow solvent on contaminated wipes to evaporate before disposal (staff is allowed to use the wipes until they are dry, but not to allow them to air dry for the sole purpose of rendering them non-hazardous). [Whereas there is no regulatory citation that deals with this issue directly, it is based on a regulatory interpretation made by EPA, and followed by most states, indicating that intentionally reducing hazardous waste constitutes "treatment" without a permit.]	2	
3. Paint-related waste streams are characterized to determine if they are hazardous. Waste streams may include: <ul style="list-style-type: none"> • Paint waste from pre-1978 buildings; • Solvent waste; • Solvent soaked wipes or rags; or • Used, expired, or otherwise discarded paints. [40 CFR 262.11]	2	
<i>Wastewater</i>		
4. Wastewater from any non-solvent, aqueous (e.g., steam) cleaning of paints, paint brushes or solvent-contaminated equipment is properly managed and any discharge has been permitted with the local permitting authority or treatment works (depending on whether wastewater is discharged to storm water drains or to POTW). [Permit Requirement-- See Wastewater Treatment EnviroCheck Sheet]	2 (If a permit is required)	
<i>Air Emission Standards</i>		
<i>Questions 5-6 apply only to NPS facilities using halogenated solvent degreasers (parts washing devices that hold more than two (2) gallons of solvent) that contain methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, or chloroform or any combination of these halogenated HAP solvents, in total concentration greater than five (5) percent by weight, as a cleaning and/or drying agent.</i>		
5. An evaluation has been made regarding whether solvent-cleaning units at the park fit the description of a "solvent cleaning machine" under the NESHAP. [40 CFR 63.460]	2	
6. Proper notification was submitted to EPA regarding the use of a halogenated solvent cleaning machine. [40 CFR 63.468(a)]	2	
<i>Pollution Prevention</i>		
7. Product substitution and recycling opportunities have been reviewed to determine if pollution prevention practices can be improved. (Refer to Green Procurement EnviroCheck Sheet) [BMP]	3	

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